



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/784,772	02/24/2004	Moon-Sook Lee	8947-000075/US	8340
30593 7590 12/19/2007 HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 8910 RESTON, VA 20195			EXAMINER LUND, JEFFRIE ROBERT	
			ART UNIT 1792	PAPER NUMBER
			MAIL DATE 12/19/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No. 10/784,772	Applicant(s) LEE ET AL.	
	Examiner Jeffrie R. Lund	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 December 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3-13 and 15-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-13 and 15-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Kitamura et al, US Patent 6,007,633.

Kitamura et al teaches an apparatus for fabricating a semiconductor device that includes: a process chamber 21; a susceptor 30 including a heater 35 and supporting a wafer W disposed within the process chamber; a shower part 52 disposed to face the susceptor; a first supply pipe 71 for supplying a first gas; and a heating pipe 60, 61 for heating the first gas. The heating pipes 60, 61 are connected with the supply pipes 71 and the shower part 52; is inside the processing chamber 100 (disposed between the outer wall and the susceptor); surrounds the susceptor; and is heated by radiation from the susceptor. The specific material deposited is an intended use of the apparatus, and Kitamura et al is capable of depositing a ferroelectric layer. (Entire document, specifically, figures 1 and 2)

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art

Art Unit: 1792

are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3, 8, 10, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitamura et al, US Patent 6,007,633, in view of Sakamoto et al, US Patent 5,968,593.

Kitamura et al teaches an apparatus for fabricating a semiconductor device that includes: a process chamber 21; a susceptor 30 including a heater 35 and supporting a wafer W disposed within the process chamber; a shower part 52 disposed to face the susceptor; a first supply pipe 71 for supplying a first gas; and a heating pipe 60, 61 for heating the first gas. The heating pipes 60, 61 are connected with the supply pipes 71 and the shower part 52; is inside the processing chamber 100 (disposed between the outer wall and the susceptor); surrounds the susceptor; and is heated by radiation from the susceptor.

Kitamura et al differs from the present invention in that Kitamura et al does not teach that the heating pipe coils in helix or spiral coil along the bottom (second part), sidewall (first part), and top (third part) of the processing chamber; a liner between the susceptor and the heating pipe; or a second gas inlet.

Sakamoto et al teaches an apparatus for fabricating a semiconductor device that includes: a process chamber 100; a susceptor (wafer 200 on boat 212) disposed within the process chamber; a shower part 32, 40, and 42 disposed to face the susceptor; a first supply pipe 91 for supplying a first gas; a second supply pipe 92 for supplying a second gas; a heating pipe 311 for heating the first gas; a second heating pipe 312 for heating a second gas; and a liner 10 between the heating pipe and the susceptor. The

heating pipes are: connected with the supply pipes 91, 92 and the shower part 32, 40, 42; is inside the processing chamber 100; includes a helically coiled shaped part coiled around the circumference of the susceptor from the a lower portion of the sidewall to the upper portion of the sidewall of the process chamber; and is heated by radiation from the susceptor.

The motivation for forming coils along the sides of the processing chamber is to extent the length of the heating pipe to extend the time in which the gas is preheated which results in the gas being heated to a more uniform temperature as taught by Sakamoto et al.

The motivation for adding the liner of Sakamoto et al between the susceptor and the gas inlet of Kitamura et al is to remove the heating pipe from the processing chamber environment as taught by Sakamoto et al.

The motivation for adding the second gas inlet of Sakamoto et al to the apparatus of Kitamura et al is to provide a second gas to the processing chamber.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made modify the apparatus of Kitamura et al to make the heating pipe with helical and spiral coils, add a liner, and a second gas inlet as taught by Sakamoto et al.

5. Claim 4-7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitamura et al and Sakamoto et al, as applied to claims 1, 3, 8, 10, and 11 above, and further in view of Shim et al, US Patent Application Publication 2003/0041804 A1.

Kitamura et al and Sakamoto et al differs from the present invention in that they

do not teach that the heating pipe coils are in the outer wall of the chamber.

Shim et al teaches an apparatus in which the heating pipe 130 is inside the outer wall of the chamber.

The motivation for placing the tubes of Kitamura et al and Sakamoto et al in the outer wall of the chamber is to remove the heating pipe from the processing chamber environment as taught by Shim et al.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made place the heating pipes of Kitamura et al and Sakamoto et al in the outer wall as taught by Shim et al.

6. Claims 12, 13, and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitamura et al and Sakamoto et al, as applied to claims 1, 3, 8, 10, and 11 above, and further in view of Shinriki et al, US Patent 6,800,139 B1.

Kitamura et al and Sakamoto et al differ from the present invention in that they do not teach a MOCVD apparatus, the first gas is an oxygen gas supplied at room temperature, the second gas is a heated gas containing Pb, Zr and Ti for depositing a ferroelectric layer, or that the first gas flows into a first part of the shower and the second gas flows into a second part of the shower, separated from the first part.

Shinriki et al teaches an MOCVD apparatus for depositing a PZT ferroelectric layer that includes: a shower part 50; a first supply pipe 80 for supplying an oxygen gas (NO<sub>2</sub>) at room temperature to a first shower part 58A-58C; a second gas supply pipe 62, 66 for supplying a heated metal organic gas containing Pb, Zr and Ti (column 7 lines 29-46) to a second part 56A, 56B, not connected to the first part. (Entire document,

Art Unit: 1792

specifically, figures 1 and 3)

The motivation for replacing the gas sources and shower of Kitamura et al and Sakamoto et al with the gas sources with heated gas line and shower of Shinriki et al is to enable the apparatus of Kitamura et al and Sakamoto et al to deposit a PZT ferroelectric layer as taught by Shinriki et al.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the gas sources and shower of Kitamura et al and Sakamoto et al with the gas sources with headed gas line and shower of Shinriki et al.

### ***Response to Arguments***

7. Applicant's arguments filed August 6, 2007 have been fully considered but they are not persuasive.

Regarding the arguments directed to the 102 rejection, the Examiner still believes that the term "surround" does not imply a planar relationship between the objects as previously argued.

Regarding the arguments directed to the 103 rejections, the Examiner disagrees for the following reasons:

- a. First, the number of wafers is not material to the problem being solved. Kitamura et al and Sakamoto et al both are directed to problem of preheating the precursor gases. Thus they are combinable.
- b. Second, Applicant's arguments with respect to claims 4 and 9 have been considered but are moot in view of the new grounds of rejection.

8. The Examiner notes that if the Applicant were to amend the claim 1 to include the

Art Unit: 1792

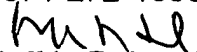
flat coil in the bottom of the chamber, the helical coil in the side wall of the chamber and a flat coil surrounding the showerhead, such an amendment will overcome the 102 rejection above, and may overcome the 103 rejections above.

**Conclusion**

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrie R. Lund whose telephone number is (571) 272-1437. The examiner can normally be reached on Monday-Thursday (10:00 am - 9:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Jeffrie R. Lund  
Primary Examiner